Southern Wisconsin Forest Health Update

Wisconsin DNR, Forest Health Protection Unit
October 20th, 2016 Vol. 13 No. 4

Topics in this update

Articles in this newsletter were written by Mark Guthmiller, Regional Forest Health Specialist, unless otherwise noted.

Forest Health Retirement

Editor's Note:
After 26 years of beating the bush for bugs in one capacity or another, I have decided to hang up the axe. I started my career as a part time surveyor in 1990. My first job with WI DNR Forest Health Protection was to survey 20 ash sites for something called ash yellows. I will be wrapping it up at the end of October with this edition being my last issue before handing it over to new hands. I have enjoyed sharing my adventures and observations around southern Wisconsin with you all. As mentioned, I started my career with a survey for ash yellows, a phytoplasma disease. It seems only fitting to end with a final wrap up on this year's phytoplasma survey results. I will take you down memory lane (the yellow leaf road) a bit as well. It has been a most enjoyable career. Thanks to all of you who have helped feed my curiosity. I hope along the way I have helped one or two of you!

Mark Guthmiller will be retiring at the end of the month.

Phytoplasmas - 26 Years of Observations

What are Phytoplasmas
Phytoplasmas are wall-less, specialized bacteria-like microorganisms that act as pathogens in infected trees, causing various symptoms, including small and yellow foliage, slow or stunted growth, thin crowns, branch dieback and/or vertical bark cracks and in some cases tree

mortality. Infected trees and stumps may produce clusters of spindly shoots that are known as "witches brooms". This phytoplasma caused broom production is highly variable between tree species and often not observed. The phytoplasma-caused disease on ash is known as ash yellows, and mortality of infected white ash has been observed in forested settings. Broom production is rare on white ash until the tree is cut then brooms commonly form on the stump. Green ash seems to tolerate phytoplasma better than white ash but is more likely to produce brooms on a living trees. Phytoplasma is transmitted by sucking insects such as leafhoppers and planthoppers. Phytoplasma is found in the foliage and phloem tissue of the tree, including roots. In some host species it disrupts the photosynthetic machinery of the tree causing the yellow chlorotic and sometimes reddish looking foliage.

1990 Ash Yellows Woodland Surveys

While cleaning out my files last week I came across my old folder of notes from my very first survey I had undertaken with DNR. I found a hand written note on an Agenda for an "Ash Decline Survey" from our state forest pathologist at the time, Jane Cummings Carlson, stating: "Plan on attending the June 6th training session". The training session was in Bellevue, Iowa at the Bellevue State Park along the Mississippi River where we would get to see ash yellows first hand and learn about survey techniques. In the typed notes written by Missouri's forest Pathologist, Christopher Luley, it stated in part:

> Ash yellows which is caused by mycoplasmalike organisms (MLO), has been associated with a serious decline of ash species in northeastern states (Matteoni and Sinclair, 1985). The disease was recently identified in a number of Midwestern states including Iowa, Missouri, Wisconsin, Illinois and Minnesota from a number of different species including white (Fraxinus Americana L.), green (F. pennsylvanica Marsh. Var. lanceolata), black (F. nigra Marsh.), and blue (F. quadrangulata Michx.) ash (Sinclair et al., 1987; Gass and Luley, 1988; A. Prey, pers. comm.).

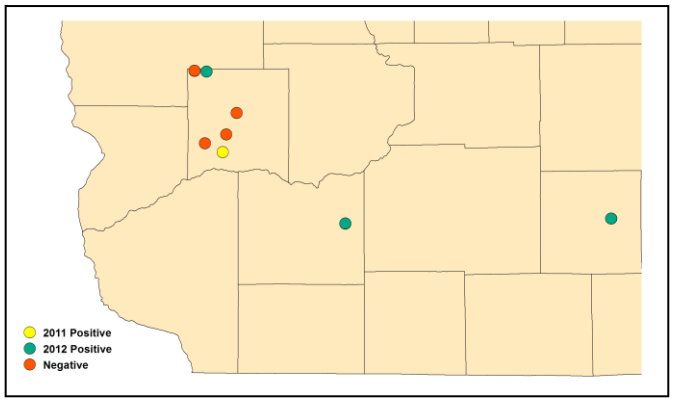
Forest health records indicated ash yellows was identified for the first time in Wisconsin in 1987 at two locations, from white ash roots tested at UW Madison. One white ash in Marathon County and two ash trees in the same stand in Waukesha County tested positive. The 1990 survey was the first formal survey for ash yellows in Wisconsin. The survey included locating 10 green ash and 10 white ash woodland stands for sampling and testing. To confirm ash yellows at that time a lab technique called the DAPI root analysis, using fluorescent microscopy, was performed on pencil sized roots. This required digging out two roots on opposite sides of a tree, fixing the roots in glutaraldehyde with a buffer, and sending it to a lab in New York for testing. Since that time, Polymerase Chain Reaction (PCR) techniques have been developed, greatly simplifying sampling and testing (See article later in this newsletter on this PCR method). Now sampling just involves clipping some leaves.

The results of the 1990 survey included two positive detections out of the twenty sites sampled in Wisconsin. This 10% occurrence indicated a relatively limited establishment of ash yellows at that time in Wisconsin. Iowa, Illinois, and Missouri also participated in the 1990 survey and positive detections in those states were close or just over 50%, indicating a more established presence compared to Wisconsin.

Since the 1990 survey we continued to survey for ash yellows and would make laboratory confirmation of new first detections at a county level. In 2015 ash yellows was confirmed on black ash in Rusk County, one of the northern most counties in Wisconsin to date and our most recent new county for ash yellows confirmation.

2011-2012 Juglans Phytoplasma Testing

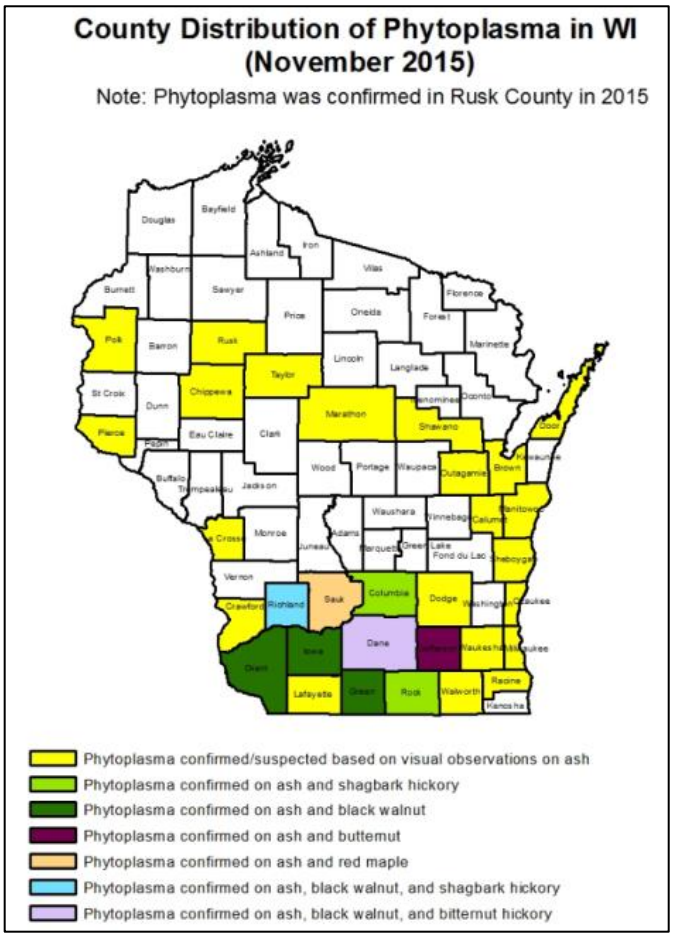
In 2011 and 2012, samples of walnut from 8 sites showing symptoms of phytoplasma were tested. Four sites tested positive and four sites negative for phytoplasma on *Juglans*. Three sites had phytoplasma confirmed from black walnut and one site in Jefferson County on butternut. In addition, three sites had samples of walnut scale (an insect) collected and tested for phytoplasma, to determine if they could possibly be a vector of the phytoplasma. All scale samples tested negative for phytoplasma.



Locations of 2011-12 phytoplasma testing on black walnut and butternut.

2015 Multi-Species Phytoplasma Testing

In 2015, a total of 30 samples were collected from a number of tree and shrub species in southern Wisconsin that showed symptoms of possible phytoplasma infection. Phytoplasma was confirmed on red maple, shagbark hickory and bitternut hickory for the first time in Wisconsin, in counties where phytoplasma had already been found on other species. Samples were also collected from *Amelanchier spp.*, river birch, hackberry, bur oak, white oak and silver maple, but the test results were all negative for these species. As mentioned earlier, phytoplasma was detected for the first time in Rusk County, on a symptomatic 14 inch diameter black ash tree. The tree had epicormic sprouts but not brooms.



Map showing various tree species confirmed with phytoplasma after the 2015 testing results. Map by Kyoko Scanlon.

2016 Multi-Species Phytoplasma Testing

The results of 2015 prompted more surveys and testing of a number of plant species. A total of 69 samples, including 32 tree and shrub species and 1 spittlebug insect, were sampled. A total of 23 out of 69 samples were positive for phytoplasma, a 33% recovery rate. A summary of the positive detections are listed below:

First Wisconsin confirmations of new host species – 2016 survey:

-Alder spittlebug (*Clastoptera obtusa*) 1 specimen collected from a phytoplasma positive bitternut hickory in a woodland (Iowa Co.)
-Hazelnut (*Corylus* sp.) 1 shrub from one woodlot (Richland Co.)
-American Beech (*Fagus grandifolia*) 2 trees from the same woodlot (Dodge Co.)
-Mulberry (*Morbus* sp.) 1 tree from a state rest area (Jefferson Co.)
-White spruce (*Picea glauca*) 2 trees from the same plantation (Dodge Co.)
-Swamp white oak (*Quercus bicolor*) 1 tree from one plantation (Grant Co.)
-Lilac (*Syringa* sp.) 1 shrub from a municipal park (Dodge Co.)
-Elm (*Ulmus* sp.) 1 tree from one woodlot (Richland Co.)

Additional 2016 confirmations in new locations on previously confirmed hosts

-Bitternut hickory (*Carya cordiformis*) 2 total trees from two woodlots (Iowa, Richland Co.)
-Butternut (*Juglans cinerea*) 1 tree from one plantation (Richland Co.)
-Black walnut (*Juglans nigra*) 5 total trees from 2 plantations and 1 woodlot (Grant, Richland, Sauk Co.)
-White ash (*Fraxinus americana*) 2 trees from one woodlot (Richland Co.)
-Green ash (*Fraxinus pennsylvanica*) 3 total trees from 1 county park, 1 woodlot, and 1 yard (Dodge, Jefferson, Rock Co.)

Other tree and shrub species tested with negative results for phytoplasma

-Maple (*Acer sp.*) suspect Freeman maple cultivar
-Silver maple (*Acer saccharinum*)
-Sugar maple (*Acer saccharum*)
-River birch (*Betula nigra*)
-Hackberry (*Celtis occidentalis*)
-Glossy buckthorn (*Frangula alnus*)
-Blue ash (*Fraxinus quadrangulata*)
-Honeysuckle (*Lonicera sp.*)
-White oak (*Quercus alba*)
-Red oak (*Quercus rubra*)
-Bur oak (*Quercus macrocarpa*)
-Staghorn sumac (*Rhus typhina*)
-Black locust (*Robinia psuedoacacia*)
-Multiflora rose (*Rosa multiflora*)
-Willow (*Salix sp.*)
-Basswood (*Tilia Americana*)
-Siberian elm (*Ulmus pumila*)
-Prickly ash (*Zanthoxylum americanum*)

Photo gallery of 2016 phytoplasma confirmations

1. Spittle of the spittlebug, *Clastoptera obtusa*, on bitternut hickory 2. Reddish chlorotic foliage on a bitternut hickory sapling 3. Reddish chlorotic foliage of hazelnut 4. Chlorotic foliage on American beech 5. Mulberry with leaf cupping, mottling, and chlorotic leaf margin 6. White spruce showing dense branch growth pattern.

Photo gallery of 2016 phytoplasma confirmations (cont.)

7. Elm with chlorotic foliage 8. Lilac with leaf cupping and dense broom like growth 9. Black walnut with chlorotic elongate leaves with reddish petiole 10. Butternut with chlorotic elongate leaves 11. Swamp white oak with stunted and chlorotic leaves.

Discussion on Phytoplasma Results - So What Does This Mean?

Well, we really don't know what these results mean and this information generates a lot more questions than answers. What we do know is that phytoplasma can be very detrimental to the health of some plant species, white ash for instance, while other plant species seem to tolerate phytoplasma and show minimal apparent impacts. Some of the questions that come to mind include:

-Are these newly confirmed host species infected with the same species of phytoplasma that is found on ash? There are many species of phytoplasma and many plant species impacted by phytoplasma. The genus is referred to as *Candidatus* Phytoplasma. In ash yellows it is referred to as Ca. Phytoplasma fraxini.

-If indeed it is the same phytoplasma species impacting these other tree and shrub species as ash, is the more commonly observed infected ash serving as a reservoir of phytoplasma that could be transmitted to other tree host species? Transmission of phytoplasma is considered to be mainly by sucking insects such as leafhoppers and plant hoppers.

-Are we seeing new infected tree species due to an addition or change in sucking insect species that could vector the phytoplasma? The broader the tree host range of the insect the greater the opportunity for more host species being impacted by a particular insect vector of phytoplasma. As an example, the Alder spittlebug *Clastoptera obtusa,* that we confirmed with the presence of phytoplasma, was feeding on hickory which was also confirmed with phytoplasma. This spittlebug species, in addition to alder and hickory, has also been documented as feeding on witch hazel and a couple of birch species. Once phytoplasma gets into a new host species there may then be a whole different group of potential insect vectors with a different tree host range. One can envision a slow build of phytoplasma over time by this cross transmission by various species of sucking insects. Understanding which species of insects might be involved with vectoring phytoplasma across the known tree host range currently confirmed with phytoplasma may be an important area of further study.

-Do trees impacted with phytoplasma predispose them to frost cracking? This may be an especially important question related to walnut, oak and other high value tree species. Some of the walnut sites confirmed with phytoplasma had experienced various levels of what appeared to be frost cracks on the main trunk and occasionally limbs. These sites were frequently low bottom riparian areas but also more upland on occassion. In 2015, there were similar frost-like cracking (and bark sloughing) symptoms to red maple in sites that we ended up confirming phytoplasma on this species. These confirmations were both upland and bottomland sites. In the phytoplasma positive swamp white oak sampled this year, it came from a mixed species plantation that had a number of red, white and swamp white oaks exhibiting frost cracks. However, with limited testing, only the one swamp white oak was confirmed with phytoplasma. Monitoring of both conifer and hardwoods for frost cracking and testing for potential phytoplasma infection may be worth further study.

-What role is phytoplasma playing in the dieback and mortality of bitternut hickory? A couple sites with hickory mortality, associated with other pest and pathogen organisms, also

have phytoplasma present in the stand. Is phytoplasma predisposing the tree to attack by other pests and disease, such as hickory bark beetles, 100 cankers disease and/or phompsis?

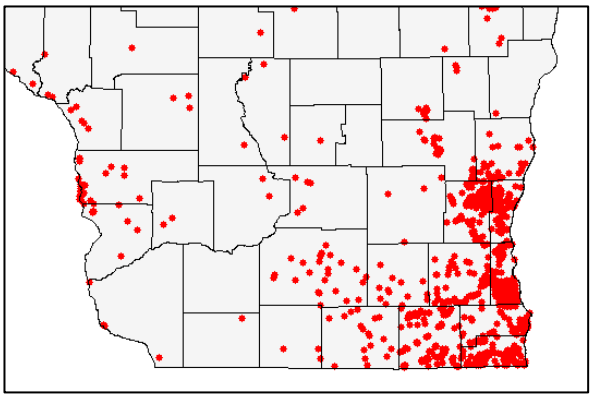
-Is phytoplasma playing some role in the numerous observations of trunk and branch brooms recently observed on shagbark hickory? We have confirmed phytoplasma in shagbark hickory in 2015 from foliage on trees exhibiting outer branch brooms. However, we tested a number of trees in 2016 with similar trunk and branch brooms with phomopsis-like woody gall growth this year which tested negative for phytoplasma; including foliage, gall, and woody tissues.

-Is there any structural changes to wood infected with phytoplasma and would trees or lumber be prone to breakage or failure? Although based only on antedotal comments about brittleness, structural testing of such infested material may be worthwhile to answer this question.

There are many more questions and much to learn about phytoplasma. I believe continued awareness of phytoplasma and monitoring for impacts of this disease is highly warranted.

Emerald Ash Borer– Bill McNee

In early October, EAB was found in Manitowoc County for the first time. A property owner in the Town of Schleswig (near Kiel) reported suspicious trees which were confirmed to have EAB. Manitowoc County was quarantined in 2014, and forest management recommendations would not be affected by this detection. Insecticide treatments should be considered for ornamental ash trees in southern Wisconsin next spring.



EAB detections in southern Wisconsin as of mid-October.

New village or city detections in southern Wisconsin since the last pest update are:

- Dane Co. – Cottage Grove, Mount Horeb
- Juneau Co. – Mauston
- Milwaukee Co. – Shorewood
- Racine Co. – Sturtevant, Union Grove

As of mid-October, we have had 84 new municipal EAB detections so far this year. This year will easily set a record, surpassing the 50 detections found in all of 2015. A complete list of municipal EAB detections can be found on the Wisconsin emerald ash borer website .

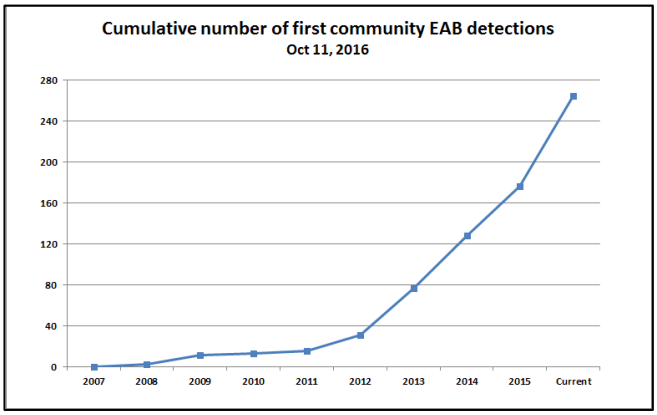
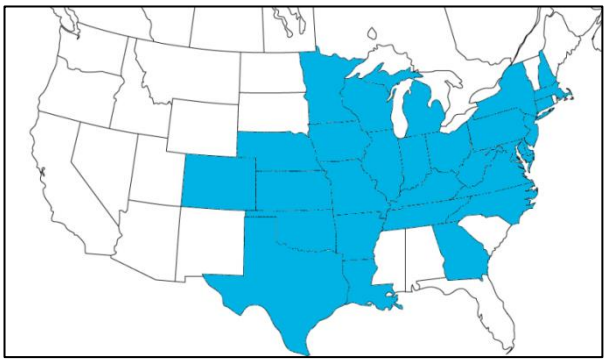


Chart showing cumulative number of first community detections in Wisconsin

EAB was recently found in Oklahoma for the first time, in the northeast part of the state (Delaware County). Oklahoma is the 29th state to find EAB.



States with an EAB detection are shown in blue.

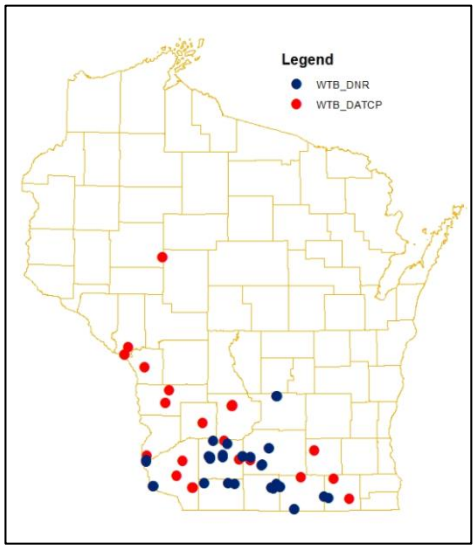
Gypsy Moth– Bill McNee

Now is the time for landowners and managers to look for gypsy moth egg masses to predict the pest's population size and potential damage to trees next year. For more information on how to do egg mass surveys, visit the Wisconsin gypsy moth website. Information on oiling or removing egg masses is also available at this website. DNR staff received relatively few reports of nuisance caterpillars or egg masses in 2016, although reports were more numerous than last year.

Gypsy moth egg masses. Photo by Bill McNee.

Trappers from the Wisconsin Dept. of Agriculture, Trade and Consumer Protection (DATCP) have finished taking down their grid of gypsy moth traps, and about 85,000 male moths were caught. Catch numbers are about 12,000 lower than last year. The highest numbers of moths were trapped in Bayfield County (11,241 moths) and Juneau County (8,551 moths).

Applications for the 2016-17 DNR gypsy moth suppression program must be postmarked by Friday, December 2 of this year for spraying in the spring of 2017. The 2016-17 application form and a list of county and municipal gypsy moth contacts can be found online. If you decide to participate in the suppression program, please let Bill McNee know in advance of the December deadline (bill.mcnee@wisconsin.gov). If an area is thinking of participating in the DNR suppression program to spray in 2017, oil the masses or wait until this December to remove them so that surveyors can determine if an area should be sprayed.



Combined DNR and DATCP walnut twig beetle trapping locations in 2016. Map created by Mike Hillstrom.

Walnut Twig Beetle Survey

Scott Schumacher, our DNR forest health specialist who has been conducting the walnut twig beetle and emerald ash borer surveys, just finished up screening all walnut twig beetle trap samples collected over the field season. A total of 40 traps were set, primarily on state and county property, in eight counties. In addition to WI DNR, the WI DATCP also set traps for walnut twig beetle. There were no detections of walnut twig beetles from DNR set traps this year. DATCP trap data is pending. To date walnut twig beetle, which is associated with thousand cankers disease, has not been detected in Wisconsin.

Beech Blight Aphid– Bill McNee

Beech blight aphid has recently been generating calls from property owners in the lakeshore counties where beech is a common tree species. The aphids have long, white filaments on their posterior end, and appear to 'dance' as they shake themselves. The insects are also known as the 'boogie woogie aphid' because the colony will start shaking when disturbed. They feed on the sap of beech branches and twigs, but rarely cause significant damage.

Beech blight aphid on a twig. Photo by Bill McNee.

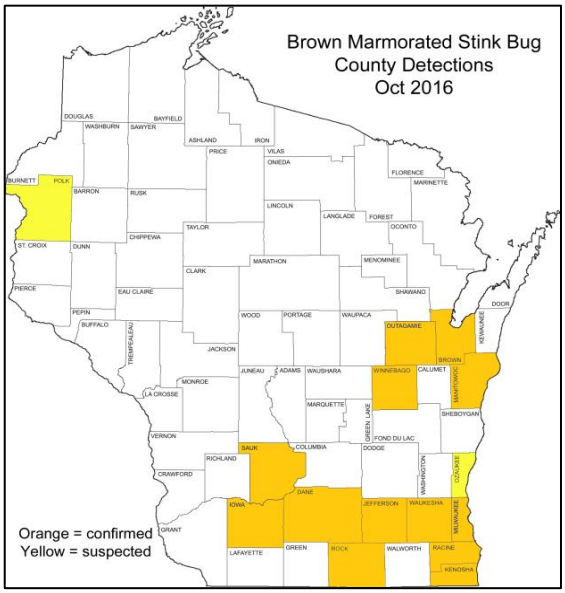
Closeup photo of a beech blight aphid with woolly filaments. Photo by Bill McNee.

Brown Marmorated Stink Bug – Bill McNee

Now that fall is here we have been getting reports of brown marmorated stink bug (BMSB) congregating on and inside homes. The map below shows the counties where BMSB is known or suspected. At present, Dane County has generated far more reports than elsewhere in the state. The Milwaukee area and the Fox Valley are the other two areas generating the most reports.

BMSB can be identified by the banded (black/white) antennae and 'piano key' banding pattern on the edge of the abdomen. This agricultural pest is native to eastern Asia and was first noticed in Pennsylvania in 1998.

Brown marmorated stink bug adult. Photo by **David R. Lance, USDA APHIS PPQ; from www.bugwood.org.**



Counties where brown marmorated stink bug has been confirmed (orange) and suspected (yellow). Modified from a map by PJ Liesch, UW-Madison Department of Entomology.

Molecular Methods in the Forest Health Lab – Colton Meinecke

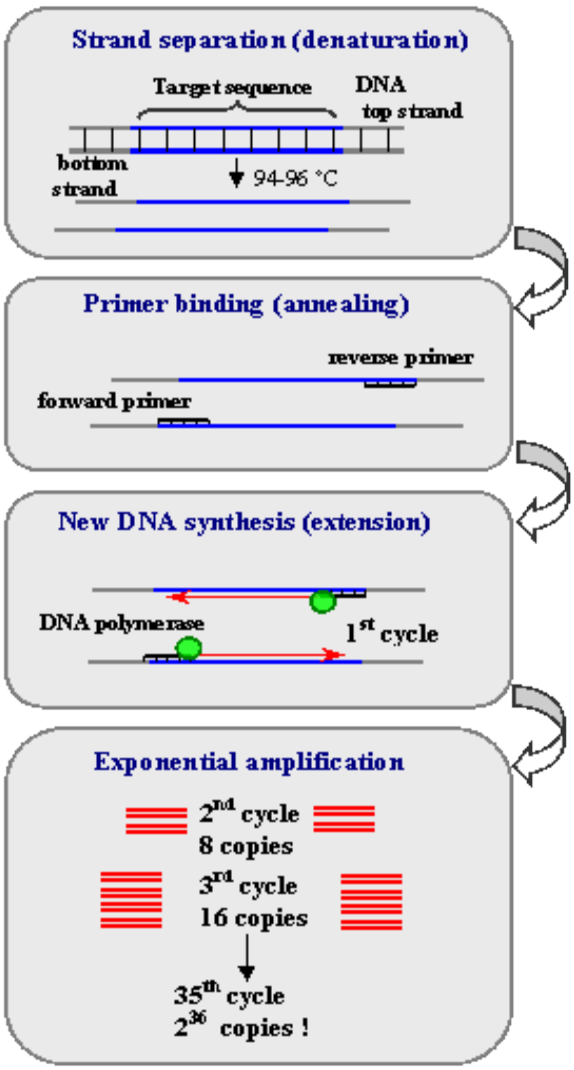
In the 2016 growing season the Forest Health team has begun using polymerase chain reaction (PCR) technology to aid in the detection and identification of forest pathogens.

PCR is a common technique used in molecular biology to amplify individual copies of specific regions of DNA. In a diagnostic clinic, PCR is a powerful tool as it allows for the specific amplification and subsequent detection of minute amounts of pathogen DNA in a host sample. The Forest Health Team is employing this technology as an additional tool to positively identify the DNA of the oak wilt pathogen, *Ceratocystis fagacearum*, in samples and to diagnose cases of oak wilt throughout the state. A successful diagnosis of oak wilt using PCR involves three main steps: extraction of all DNA from the sample, amplification of pathogen DNA by PCR and separation and visualization of PCR products by gel electrophoresis and UV illumination.

Wood samples to be tested for *C. fagacearum* are inspected for the discoloration of vascular tissue and the discolored tissue is drilled and shavings collected. The DNA of the wood and of any microbial life among the shavings, or total DNA of the subsample, is then extracted and purified of proteins, polyphenols, sugars and other contaminants.

The purified total DNA is added into a reaction mixture which will selectively and exponentially generate more copies of a desired sequence of DNA. A typical PCR reaction mixture consists of *Taq* DNA polymerase, magnesium chloride, dinucleotide triphosphates (dNTPs), pathogen specific DNA primers, sample total DNA extract and buffers to stabilize pH and salinity.

In order to achieve amplification the mixture is then cycled through three temperatures (Figure 1). Initially the reaction mixture is heated to 94-96 degrees Celsius to denature the double stranded DNA into individual strands. Then the mixture is cooled substantially to a temperature at which the oligonucleotide primers bind to the denatured sample DNA. Primers are short single



National Center for Biotechnology Information. 2014. Polymerase Chain Reaction (PCR). NCBI. https://www.ncbi.nlm.nih.gov/probe/docs/techpcr/

Figure 1. Outline of the polymerase chain reaction cycle and exponential amplification.
DNA containing the target sequence is denatured at 94-96 degrees Celsius. Primers anneal to denatured DNA at complementary sites flanking the target sequence. *Taq* polymerase assembles dNTPs to synthesize new double stranded copies of the target sequence. The steps are cycled to exponentially amplify the target sequence.

stranded segments of DNA which are designed to bind to complementary sequences on DNA of interest. Primers are designed in pairs, one for each strand of DNA. It is the sequence of DNA between the primers, or target DNA, that will be amplified. For the detection of oak wilt, the primers we use are designed to amplify a 280 base pair (bp) segment of the nuclear ribosomal ITS region of *C. fagacearum* DNA. Lastly the mixture is heated slightly to 72 degrees Celsius such that *Taq* DNA polymerase may bind to the primers and synthesize a new strand of DNA from dNTPs. This "extends" the primers and forms new segments of double stranded DNA which may then by copied in the next cycle. After 25 to 35 cycles the target DNA has been amplified hundreds of millions to billions of times.

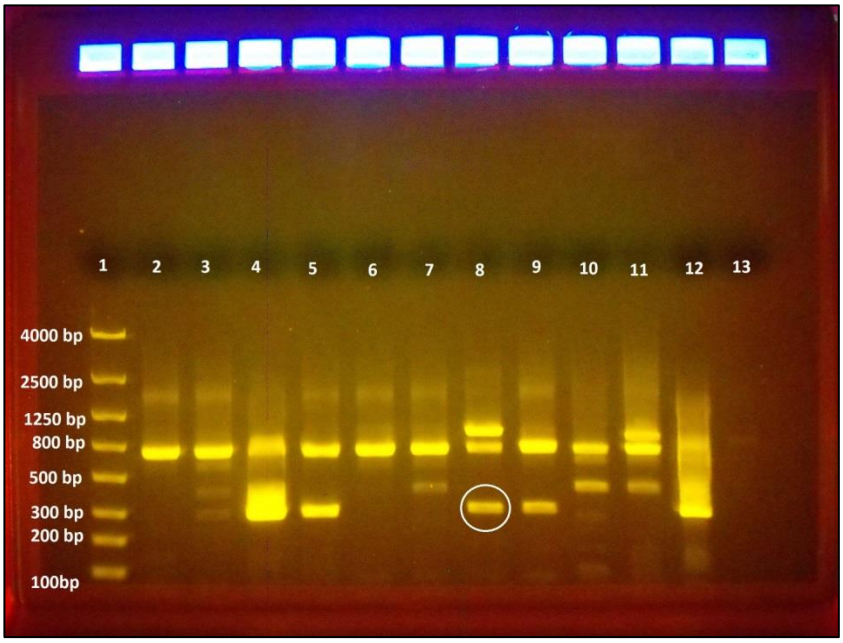


Figure 2. Gel electrophoresis of PCR products for *C. fagacearum* detection. DNA was extracted from oak wood samples and amplified using two separate PCR steps. The first step produced the fragments observed at 750-800 bp in lanes 2-12 using general fungal primers ITS1/ITS4 and serves as a positive control indicating the presence of fungi in the sample. The second step amplified the approximately 280 bp fragment unique to *C. fagacearum* using primers CF01/CF02. Lanes 3, 4, 5, 8 and 9 are examples of a positive result, indicating the presence of *C. fagacearum* in the sample. Lane 12 is a positive control using DNA extracted from *C. fagacearum* tissue grown in culture and lane 13 is a negative control.

To determine the results of the PCR, the products can be separated by length by drawing DNA fragments through an agarose gel with an electric current, in a process known as gel electrophoresis. Fragments are then visualized by staining the gel with a DNA-binding fluorescent dye and illuminating the gel with a UV light (Figure 2).

The sizes of fragments are determined by comparing distance travelled by the fragments in question to the distances of the fragments in a DNA marker, a set of fragments of known sizes. The presence of a band of light at the expected site of the target sequence indicates that the target sequence was amplified and, in a diagnostic setting, is a positive indication of a pathogen's presence in a sample.

PCR technology provides the opportunity to reduce the amount of time needed to positively confirm the presence of pathogens and offers increased detection sensitivity relative to culture-based methods. Identification of *C. fagacearum* using culture-based methods is time consuming as the fungus often takes 3 to 5 weeks to grow to the point at which it will produce characteristic conidia. Furthermore *C. fagacearum* is a sensitive organism and a weak competitor against saprophytic fungi and bacteria. Once a host sample is collected extreme care must be taken to keep the sample cool and moist, otherwise the pathogen will

likely succumb to heat, desiccation or other microorganisms and be rendered nonviable and undetectable by culture-based methods. Even in culture, *C. fagacearum* is at risk of being overtaken by other fungi before it can be identified.

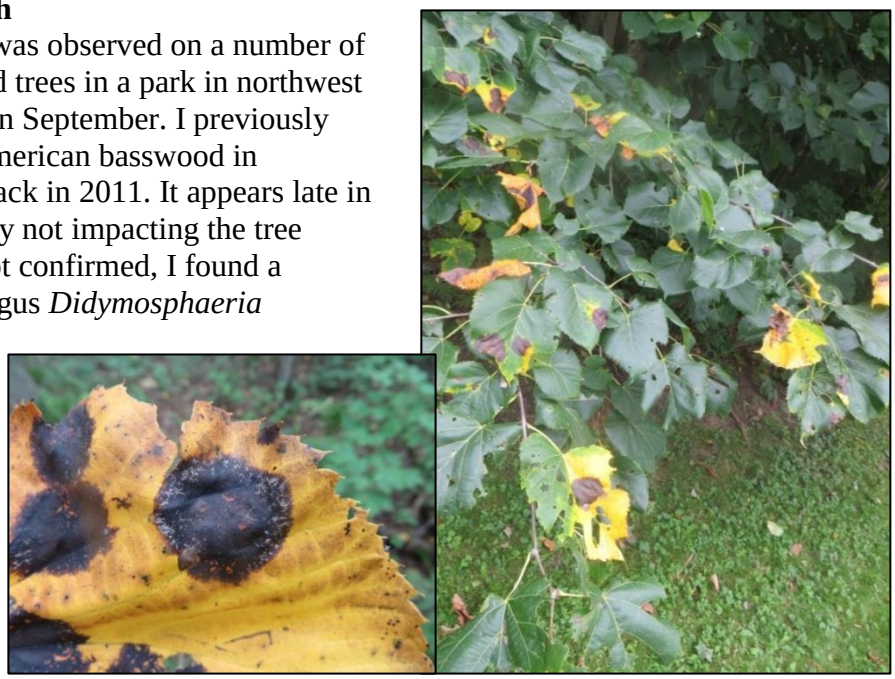
In contrast, the DNA extractions, PCR steps and gel electrophoresis can all be completed within a week and a multitude of samples may be processed in parallel. Because PCR detection requires only the presence of the pathogen's DNA, samples which have not been properly preserved or samples from dead trees may still be used as even the DNA of dead or nonviable pathogens can be detected. It should be noted however that DNA will degrade over time and the sample should still be preserved when possible to ensure the most accurate results. In addition, PCR will selectively amplify only target sequences, even in a mixture of DNA sequences isolated from the wide diversity of plant, fungi and bacteria sources that are present in a sample, with minimal risk of contamination or cross reactions. PCR primers for diagnostics are designed to eliminate cross-reactivity with other sequences and eliminate false positives within the testing parameters.

In this way PCR technology offers enhanced detection of the pathogen and expedited diagnoses while correcting for many of the issues that complicated obtaining accurate culture results. We are excited to implement these techniques and we anticipate being able to use this technology to diagnose a wide variety of forest pathogen issues.

Miscellaneous Topics and Observations

Linden Leaf Blotch

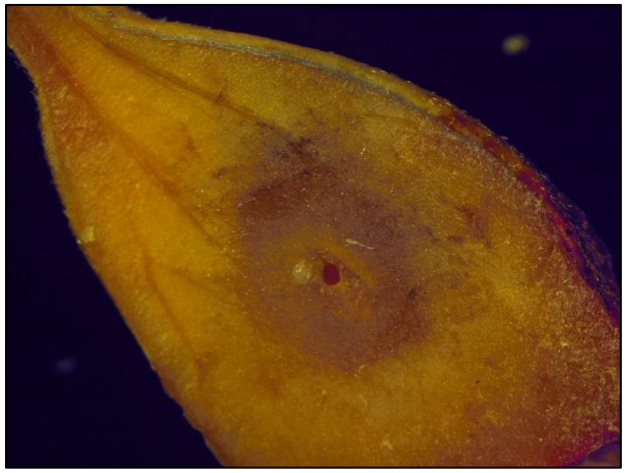
Linden leaf blotch was observed on a number of American basswood trees in a park in northwest Sauk County back in September. I previously observed this on American basswood in Lafayette County back in 2011. It appears late in summer and is likely not impacting the tree health. Although not confirmed, I found a reference to the fungus *Didymosphaeria petrakiana* as a suspect fungus causing the blotch appearance.



Large brown to black spots with yellowing foliage indicative of linden leaf blotch.

Lobed Gall on Swamp White Oak

Back in the September edition we reported on noxious oak galls on swamp white oaks. Since then we had a couple other reports of lobed galls caused by another cynipd wasp, *Andricus quercusstrobilanus*. When opening the "kernel" like section of the gall each contained a single larva.



Left: Cluster of lobed kernel like galls on the end of a swamp white oak branch. Right: An open "kernel" from the gall reveals a single cynipd wasp larval chamber.

Bacterial Leaf Scorch Testing

Eleven samples from southern Wisconsin, with various patterns of leaf necrosis, were submitted for bacterial leaf scorch testing. All eleven samples came back negative. The various tree species sampled and tested included white oak, bur oak, bitternut hickory, shagbark hickory, sugar maple, silver maple, hackberry, and blue ash.

Heading to greener forests
…or maybe just out to pasture!?
Best Wishes

SOD Forest Health Assistance
Wisconsin DNR, Forest Health Protection Unit
October 2016

Contacts for DNR staff, municipal foresters, and forestry cooperators

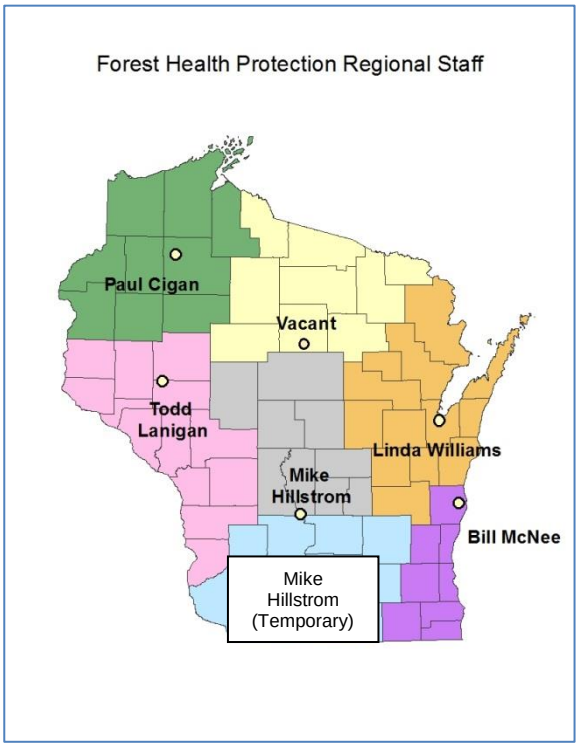
Mike Hillstrom (Temporary Coverage) Forest Health Specialist Wisconsin DNR 1242 River Road Wisconsin Dells, WI 53965 Phone: (715)459-1371 Email: Michael.Hillstrom@wisconsin.gov **Columbia, Dane, Dodge, Grant, Green, Iowa, Jefferson, Lafayette, Richland, Rock, and Sauk**	Bill McNee Forest Health Specialist Wisconsin DNR 1155 Pilgrim Rd. Plymouth, WI 53073 Phone: 920-893-8543 Email: Bill.McNee@wisconsin.gov **Kenosha, Milwaukee, Ozaukee, Racine, Sheboygan, Walworth, Washington, and Waukesha**

For a statewide forest health staff list:
http://dnr.wi.gov/topic/ForestHealth/staff.html

Additional Program Web-based Resources:
WI DNR Forest Health web site:
http://dnr.wi.gov/topic/ForestHealth/

Report Emerald Ash Borer in Unconfirmed Counties:
by phone 1-800-462-2803
by email:
DATCPEmeraldAshBorer@wisconsin.gov
visit the website: http://emeraldashborer.wi.gov

Report Gypsy Moth:
by phone at 1-800-642-6684
by email: dnrfrgypsymoth@wisconsin.gov
visit the website: http://gypsymoth.wi.gov
(It is also recommended to report gypsy moth to your local government)



Please direct public inquiries regarding yard tree concerns to UW county or state extension offices: http://www.uwex.edu/ces/cty/

[Pesticide use: Pesticide recommendations contained in this newsletter are provided only as a guide. You, the applicator, are responsible for using pesticides according to the manufacturer's current label directions. Read and follow label directions and be aware of any state or local laws regarding pesticide use.]